

1 **WELFARE ASSESSMENT OF POULTRY IN ALTERNATIVE HOUSING: COMPARISON BETWEEN**
2 **ANIMAL NEEDS INDEX AND ASSESSING FEATHER PECKING DAMAGE**

3
4 **Monique Bestman (corr. author) & Jan-Paul Wagenaar**

5 **Louis Bolk Instituut, Hoofdstraat 24, 3972 LA Driebergen, The Netherlands, Tel + 31 343**

6 **523863, Fax + 31 343 515611, m.bestman@louisbolk.nl**

7
8 Abstract

9 Two methods of welfare assessment have been compared to assess welfare in 16 organic flocks of
10 laying hens in the Netherlands: Animal Needs Index and Plumage Damage Score as a measure of
11 feather pecking. Animal Needs Index focuses on housing and management and the plumage
12 damage method only looks at the consequences of feather pecking. The correlation between
13 Animal Needs Index and Plumage Damage Score was weak: -0.54. A positive judgment according
14 to Bartussek's Animal Needs Index did not coincide with little feather pecking. Not all the factors
15 which are known from scientific studies as being associated with feather pecking during rearing or
16 at later age are adjusted to the Animal Needs Index. Animal Needs Index, nor Plumage Damage
17 Scoring alone is predictive enough for assessing animal welfare in poultry. We suggest to use a
18 combination of both methods and call a production unit only 'welfare friendly' if it scores well
19 enough according to both methods. It also might be wise to adapt the Animal Needs Index to
20 recent scientific insights.

21
22 Keywords: animal welfare, alternative housing, Animal Needs Index, feather pecking, organic
23 poultry, welfare assessment

1 **Introduction**

2 Based on its appearance (low stocking density (6 animals per m²), outdoor area available (4m² per
3 animal), as well as nests, perches and litter area available), organic poultry keeping seems to
4 enhance animal welfare. However, feather pecking is still one of the main problems in organic
5 poultry keeping (Bestman & Wagenaar (in press); Kjaer & Sørensen 2002). Feather pecking is an
6 indicator for decreased welfare in both actor (El-Ethey *et al* 2000) and victim (McAdie & Keeling
7 2000). Two methods of welfare assessment have been compared to assess welfare in organic
8 flocks: Animal Needs Index (ANI; Bartussek 1995) and Plumage Damage Score (PDS) as a
9 measure of feather pecking. The Animal Needs Index focuses on housing and management and it
10 uses a protocol to calculate an index per flock. The condition of the plumage and skin is one of the
11 many aspects that is examined in the Animal Needs Index. However, there is no correction for age,
12 despite the fact that damage caused by feather pecking increases with age. Moreover, because
13 feather damage is one of the many factors in the index, its contribution to the end judgments is
14 relatively small. Points that can be earned with good plumage and skin are only 8% of the
15 maximum number of points that can be earned if all factors are optimum. The plumage damage
16 method, which also calculates a mean per flock, only looks at the consequences of feather
17 pecking.

18 A fundamental difference exists between welfare assessment through Animal Needs Index and
19 Plumage Damage Score. The Animal Needs Index assesses factors that 'in general' are known to
20 affect animal welfare. The Plumage Damage method focuses on how the animals in a particular
21 flock assess their environment themselves (if there are shortcomings, they start feather pecking
22 and plumage damage appears).

1 **Methods**

2 For 16 organic flocks of laying hens both Animal Needs Index and Plumage Damage Score were
3 calculated. In the case of Animal Needs Index one person visited all 16 flocks to measure housing
4 systems and interview stockpersons. The protocol used is described by Bartussek (1995).

5 Plumage Damage Score was assessed by 2 different persons when flocks were between 50 and 70
6 weeks of age. Therefore, the body of a hen was divided into 9 areas that were scored on a scale
7 from 1 (no damage) to 9 (blood or (old) wound visible). Plumage Damage Score was performed on
8 a sample of 40 birds. In order to prevent scoring the same bird twice, in smaller flocks a sample
9 size of 20 was used. Birds were randomly scored at a transect, both inside the hen house and in
10 the outdoor area. In order not to disturb the animals and to prevent selecting relative tame birds,
11 birds were not handled, but scored within a distance of 2 meter from the observer. Based on the
12 sample, a mean was calculated for each flock.

13 According to their score all flocks were ranked for both methods and the Spearman rank
14 correlation coefficient was calculated.

15 **Results**

16 Results are presented in table 1.

17

18 [Table 1]

19

20 $R_s = 1 - (6 \sum d^2) / (n^3 - n)$ whereas R_s =Spearman rank correlation coefficient, d =difference in rankscore
21 between ANI and PDS series and n =number of flocks/stables.

22

23 R_s between ANI and PDS = -0.54 ($P < 0.05$).

24

1 **Discussion**

2 The correlation between Animal Needs Index and Plumage Damage Score was weak. A positive
3 judgment according to Bartussek's Animal Needs Index did not coincide with little feather pecking.
4 Therefore factors other than the ones included in the Animal Needs Index, must determine the
5 extent of feather pecking.

6 Circumstances during rearing are of crucial importance for the development of feather
7 pecking, but are not included in the Animal Needs Index. Features during rearing associated with
8 feather pecking in laying hens are: stocking density >10 birds per m^2 , having no access to elevated
9 perches (Huber-Eicher & Audigé 1999), absence of litter (Blokhuys & Arkes 1984; Johnsen *et al*
10 1998; Huber-Eicher & Sebö 2001), absence of a pecking incentive such as scattered grain
11 (Blokhuys & van der Haar 1992), absence of daylight (Keppler & Lange 2001) and absence of a
12 motherhen (Perré *et al* 2002). The possibility exists that feather pecking starts before the flocks
13 arrive on the laying farm (60% of the organic flocks in the Netherlands are bought at the age of
14 16-18 weeks (Bestman & Wagenaar in press). This may explain for the low correlation between
15 Animal Needs Index and the Plumage Damage Score.

16 Flocks involved in this study were also part of a larger study in which 63 flocks were
17 involved (Bestman & Wagenaar in press). In this study, as well as in another study (Green *et al*
18 2000), features of laying farms did prove to be associated to the extent of feather pecking.
19 Significant features found by Bestman & Wagenaar (in press), were: a low percentage of hens in
20 the flock using the outdoor run, age at purchase 16-18 weeks and a decreasing number of
21 cockerels present in the flock. Significant factors found by Green *et al* (2000) were less than 50%
22 of the birds from a flock using the outdoor run, diet being changed three or more times during lay,
23 inspections done by one person, no loose litter being left by the end of lay, hen house temperature
24 being less than 20°C , lights turned up when the flock was inspected and bell drinkers being used.
25 Not all of these features are included in the Animal Needs Index.

1 Feather pecking is regarded as an indicator for reduced animal welfare in both actor (Ei-
2 Ethey *et al* 2000) and victim (McAdie & Keeling 2000). The findings of our study suggest that too
3 much emphasis on housing and management features (92% in the ANI-protocol) does not
4 sufficiently predict animal welfare. However, Plumage Damage Score alone does not reflect
5 welfare too. It may be possible that the housing and management is not appropriate, thus
6 enhancing feather pecking, but that beaktrimming or reduced light intensity is used in order to
7 prevent feather pecking damage. Beaktrimming is not welfare friendly because it is painful in the
8 short and in the long term (reviewed by Hughes & Gentle 1995). Poultry kept at low light
9 intensities in general are more afraid (Hughes & Black 1974) and perform more stereotypic
10 pecking (Kjaer & Vestergaard 1999), both indicating decreased welfare.

11 **Conclusions**

12 Animal Needs Index, which is based mainly on housing and management features, nor Plumage
13 Damage Scoring alone is sufficiently predicts animal welfare in organic and other alternative
14 poultry flocks. We suggest to use a combination of both methods and call a production unit only
15 'welfare friendly' if it scores well enough according to both methods. It also might be wise to
16 adapt the Animal Needs Index to recent scientific insights.

17 **References**

- 18 **Bartussek H** 1995 *Tiergerechtheitsindex TGI-35L 1995 Legehennen*. Bundesanstalt für
19 Alpenländische Landwirtschaft Gumpenstein, Austria
- 20 **Bestman M W P and Wagenaar J P** (in press) Farm level factors associated with feather pecking in
21 organic laying hens. *Livestock Production Science*
- 22 **Blokhuis H J and Arkes J G** 1984 Some observations on the development of feather pecking in
23 poultry. *Applied Animal Behaviour Science* 12: 145-157
- 24 **Blokhuis H J and van der Haar J W** 1992 Effects of pecking incentives during rearing on feather
25 pecking of laying hens. *British Poultry Science* 33: 17-24

- 1 **EI-Ethey H, Aerni V, Jungi T W and Wechsler B** 2000 Stress and feather pecking in laying hens in
2 relation to housing conditions. *British Poultry Science* 41: 22-28
- 3 **Green L E, Lewis K, Kimpton A and Nicol C J** 2000 A cross sectional study of the prevalence of
4 feather pecking in laying hens in alternative systems and its associations with management and
5 disease. *The Veterinary Record* 147: 233-238
- 6 **Huber-Eicher B and Audigé L** 1999 Analysis of risk factors for the occurrence of feather pecking
7 in laying hen growers. *British Poultry Science* 40: 599-604
- 8 **Huber-Eicher B and Sebö F** 2001 The prevalence of feather pecking and development in
9 commercial flocks of laying hens. *Applied Animal Behaviour Science* 74: 223-231
- 10 **Hughes B O and Black A J** 1974 The effect of environmental factors on activity, selected
11 behaviour patterns and fear of fowls in cages and pens. *British Poultry Science* 15: 375-380
- 12 **Hughes B O and Gentle M J** 1995 Beak trimming in poultry: its implications for animal welfare.
13 *World's Poultry Science Journal* 51: 51-61
- 14 **Johnsen P, Vestergaard K S and Nørgaard-Nielsen G** 1998 Influence of early rearing conditions on
15 the development of feather pecking and cannibalism in domestic fowl. *Applied Animal Behaviour*
16 *Science* 60: 25-41
- 17 **Keppler C and Lange K** 2001 Erfolg mit der Bio-Junghenne. *Bioland* 1: 8-9
- 18 **Kjaer J B and Sørensen P** 2002 Feather pecking and cannibalism in free-range laying hens as
19 affected by genotype, dietary level of methionine + cysteine, light intensity during rearing and age
20 at first access to the range area. *Applied Animal Behaviour Science* 76: 21-39
- 21 **Kjaer J B and Vestergaard K S** 1999 Development of feather pecking in relation to light intensity.
22 *Applied Animal Behaviour Science* 62: 243-254
- 23 **McAdie T M and Keeling L J** 2000 Effect of manipulating feathers of laying hens on the incidence
24 of feather pecking and cannibalism. *Applied Animal Behaviour Science* 68: 215-229

- 1 **Perré Y van, Wauters A and Richard-Yris M** 2002 Influence of mothering on emotional and social reactivity of domestic pullets. *Applied Animal Behavioural Science* 75: 133-146

- 3 **Acknowledgements**

- 4 Thanks to Mirjam Velter and Marlies Beukenkamp for assessing ANI and PDS respectively

1 Table 1: Outcomes of Animal Needs Index and Plumage Damage Score in flocks 1-16, as well as
 2 ranks in the respective series.

Flock	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ANI ¹	30	27.5	13.5	28	19	22	19	17.5	7.5	18	19	15.5	15.5	18.5	26	23.5
Rank	16	14	2	15	9	11	9	5	1	6	9	3.5	3.5	7	13	12
DPS ²	2.0	2.1	4.3	1.7	4.5	4.3	4.0	2.7	3.7	1.1	2.3	3.2	4.9	3.5	2.0	2.1
Rank	3.5	5.5	13.5	2	15	13.5	12	8	11	1	7	9	16	10	3.5	5.5

3 ¹ ANI <21: below standard; ANI 21-24: little animal friendly; >24-28: animal friendly; >28: very animal friendly

4 ² PDS <2: no or little feather damage; PDS 2-3: moderate feather damage; PDS >3: severe feather damage

5